Effects of *Lasia spinosa* Thw. and Season on Plasma Leptin and Glucose of Weaned Female Murrah X Swamp buffalo Calves

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**ABSTRACT**

The effects of *Lasia spinosa* Thw. and season on plasma leptin and glucose were studied in six weaned female murrah x swamp buffalo crossbreed calves. All animals were randomly assigned by age into control group (n=3) and treatment group (n= 3). The treatment group was fed with an additional 30 g of dry powder of *L. spinosa* /animal /day to the concentrate in the morning every day. Radioimmunoassay method was used to determine plasma leptin while plasma glucose was determined by liquicolor GOD-PAP method. It was found that means + SD of leptin were 4.69 + 1.37, 7.01 + 2.03 and 6.94 + 3.44 ng/mL in winter, summer and rainy season respectively. The treatment with *L. spinosa* tended to reduce plasma leptin in winter and rainy season and moderately increase in summer. In control animals, means + SD of plasma glucose were 58.50 +9.22, 65.50 + 8.17 and 66.53 + 5.36 mg/dl in winter, summer and rainy season respectively while in treatment animal means + SD of plasma glucose were 62.19 + 6.7, 68.03 + 6.05 and 64.89 + 4.55 mg/dl in winter summer and rainy season respectively. Glucose / leptin ratio was elevated from 12 to 17 and 10 to 11 in winter and rainy season respectively. Reduction of glucose/ leptin ratio was 9 of both control and treatment in summer. In conclusion, plasma leptins were lower in winter than in summer and rainy season while their plasma glucoses were not different. The treatment tended to reduce plasma leptin in winter and rainy season and modulately increase in summer. The plasma glucose /leptin ratios were elevated in winter while they were not different in summer and rainy season. Suggesting for future research is that more number of animals and plasma insulin should be determined.

**Keywords**: Glucose, *Lasia spinosa* Thw, leptin, season,weaned murrah x swamp buffalo crossbreed calves

**INTRODUCTION**

Unlike other dairy animals the buffalo presents the farmer with problem of growth and late maturity and summer subfertility. Development and attainment of puberty are determined primarily by nutrition from the time of weaning (Camparnile et al., 2001). In Thailand, it was reported that *Lasia spinosa* thw. being used as internal veterinary medicine as growth promoter to enhance growth rate and improve feed efficiency in cattle and buffalo (Buranamanus, P. 2001). The effective dose of *L. spinosa* Thw. is 30 g dry weight /buffalo/day as a practical use by the farmers does help growth performance. In Thailand, higher average daily gain of swamp buffalo calves were found in winter (Jan-Feb) than summer (Mar-May) and rainy (Jun-Jul) season which average daily gain were 579.5, 554.4 and 552.7 g/d respectively (Luengcharatsuriya et al., 2007). In buffalo, leptin hormone play an important role in regulating fat metabolism and growing (Di Palo et al 2005). In addition, glucose to leptin ratios were used as a new diagnostic marker in patients with diabetes mellitus in human (Baban et al 2010). Therefore, attempts were made to study the effects of *L. spinosa* thw. on enhancing growth rate of weaned buffalo in relation to the change of plasma leptin and glucose of weaned female murrah x mwamp buffaloes in winter summer and rainy season.

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MATERIALS AND METHODS

Experimental animals
The study was carried out at the Murrah farm, Chachoengsao Province in the eastern part of Thailand, belonging to Mrs. Runchuan Hengtrakulsin during Jan-July 2006. Six murrah x swamp buffaloes between 9-12 months old and 115 – 156 kg body weight were selected for this study. All animals were randomly assigned by age into two groups, control group (n=3) and treatment group (n=3). The treatment group was fed with an additional 30 g of dry powder L. spinosa Thw./animal/day to concentrate everyday in the morning (7.00 am.) for 7 months during late winter (Jan-Feb) summer (Mar-May) and early rainy season(Jun-Jul).

Source of plants
The whole plants (leaves, rhizome and root) of L. spinosa Thw. were collected from Suphanburi province (Middle part of Thailand) and authenticated by comparison with the herbarium specimens from Department of Botany, Faculty of Science, Chulalongkorn University, Thailand.

Preparation of L. spinosa Thw. for feeding the animals
The fresh plants of L. spinosa Thw. were blended and dried at 40 °C in hot air oven (moisture 10-13 %) and girded as powder then weighing in the amounts of 30 g/animal/day. It was then mixed in concentrate which contained soy source meal, cassava and cassava leaves and fed to the animals in the morning (7.00am.)

Blood collection
Plasma sample was collected at 9.00 am. every 10 days during January – July. All plasma samples were determined for leptin and glucose.

Plasma glucose and Leptin analysis
All plasma samples were assayed for glucose by the glucose liquicolor GOD-PAP Method (Human Gesellschaft fur Biochemica und Diagnostica MbH,Germany). Plasma concentration of leptin was determined using a multispecies RIA kit (LINCO) Research Inc, St. Louis Mo. USA. (Campanile et al 2001 and Delavaud et al 2002). The sensitivity of the leptin assay was 2.8 ng/mL and the intra- and inter- assay coefficients of variation were 3.66  and 9.89 % respectively.

RESULTS AND DISCUSSION

Effects of L.spinosa Thw. on plasma Leptin and glucose levels.
Circulated concentrations of leptin in control animals were 4.69±1.37,ng/mL 7.01±2.03 ng/mL and 6.94±3.44 ng/mL in winter summer and rainy season respectively (Table 1). a Plasma leptin concentration of animals on 30 g of dry powder of L. spinosa /animal/day group were 3.73± 1.62ng/mL, 7.73±2.08 ng/mL and 6.14±3.21 ng/mL in winter summer and rainy season respectively. These were affected by different season as shown by means ± SD plasma leptin of control animals in winter which were higher than in rainy season and summer as well as in treated animals. These occurrences also have been reported in mature ovariectomized cows, serum concentrations of leptin increased by 34% from early winter to the summer solstice and remained unchanged throughout the remainder of the year (Garcia et al 2002). It was found that the treatment with 30 g of dry powder of L. spinosa /animal /day could reduce plasma leptin in buffalos in winter and rainy season and it moderately increased in summer season compared to the control animals (Table 1). Plasma leptin is positively related to feeding level in adult cattle and that an effect of meal intake could be mediated by glucose and (or) ketone bodies. (Delavaud et al 2002). In buffalo, heifers fed the high energy diet had greater circulating concentrations of metabolic substrates (glucose, total cholesterol and HDL cholesterol) and metabolic hormones (insulin, glucagon, leptin and T3). Thus plasma glucose concentrations were measured to evaluate the effects of L. spinosa Thw. Similar results were found in our study, greater glucose and plasma leptin in treated animals in summer. The reduction in plasma glucose levels correlated to lower plasma leptin were found in animals in rainy season. In buffalo, a reduction in plasma leptin was due to low energy diet feeding (Campanile et al 2010). In addition, it was also reported in cattle
with under nutrition (Ahima and Flier,2000). The declines in plasma leptin with higher plasma glucose were found in treated animals in summer season. This is in contrast to other studies (Delavaud et al.,2002). In the present study, the plasma glucose concentrations were not different in both control ( 58.50-66.53 mg/dl) and treatment (62.19-68.03 mg/dl) groups. This may be demonstrated that the glucose clearance rate was greater in heifer calves (Depew et al 1998) which was unaffected by treatment with L.spinosa. An interest observation was average daily gains of swamp buffalo which were 579.5, 554.4 and 552.7 g/d in winter, summer and rainy season respectively. Association to our finding that plasma glucose / leptin ratio was greater in winter than in summer and rainy season both in control and treatment animals.

These data provide evidence for specific changes in control and the treatment with 30 g of dry powder of L. spinosa /animal /day in winter, summer and rainy season of six female weaned murrah x swamp buffalo crossbreed calves. The levels of plasma leptin were 4.69, 7.01 and 6.94 in winter, summer and rainy season respectively. Plasma leptin was decreased in winter and rainy season but was moderately increased in summer. While plasma glucose/ leptin ratios were elevated in winter, the reduction was found in summer and rainy season. The knowledge from this point of views was convincing for further study to identify the glucose/leptin ratio as an indicator for prediction of growth rate in buffalo and plasma insulin should also be studied.

REFERENCES
Table 1. Mean ±SD plasma leptin and glucose in winter, summer and rainy season and glucose / leptin ratio of weaned female murrah x swamp buffalo in control animals and the treatment animals which was fed with an additional 30 g. of dry powder *L. spinosa* Thw./animal/day.

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<th>Control</th>
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<th>Orally treatment with <em>L. spinosa</em> Thw.</th>
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<tr>
<td></td>
<td>Mean ± SD</td>
<td>Ratio (Glucose/leptin)</td>
<td>Mean ± SD</td>
<td>Ratio (Glucose/leptin)</td>
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<td><strong>Winter (n=15)</strong></td>
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<tr>
<td>Plasma leptin (ng/mL)</td>
<td>4.69 ± 1.37</td>
<td>12</td>
<td>3.73 ± 1.62</td>
<td>17</td>
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<td>Plasma glucose (mg/dl)</td>
<td>58.50 ± 9.22</td>
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<td>62.19 ± 6.70</td>
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<td><strong>Summer (n=27)</strong></td>
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<td>Plasma leptin (ng/mL)</td>
<td>7.01 ± 2.00</td>
<td>9</td>
<td>7.73 ± 2.08</td>
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<tr>
<td>Plasma glucose (mg/dl)</td>
<td>65.50 ± 8.17</td>
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<td>68.03 ± 6.05</td>
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<td><strong>Rainny (n=15)</strong></td>
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<td>Plasma leptin (ng/mL)</td>
<td>6.94 ± 3.44</td>
<td>10</td>
<td>6.14 ± 3.21</td>
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<tr>
<td>Plasma glucose (mg/dl)</td>
<td>66.53 ± 5.36</td>
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<td>64.89 ± 4.55</td>
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